PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 60276-300230	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/US01/01595	International filing date *(day/month/year)* 16 January 2001 (16.01.2001)	Priority date *(day/month/year)* 21 January 2000 (21.01.2000)

International Patent Classification (IPC) or national classification and IPC

IPC(7): H04N 9/68 and US Cl.: 348/234

Applicant

LIGHTSURF TECHNOLOGIES, INC.

---

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of ⁷ 7 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of — sheets.

---

3. This report contains indications relating to the following items:

   I ☒ Basis of the report

   II ☐ Priority

   III ☐ Non-establishment of report with regard to novelty, inventive step and industrial applicability

   IV ☐ Lack of unity of invention

   V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

   VI ☐ Certain documents cited

   VII ☐ Certain defects in the international application

   VIII ☐ Certain observations on the international application

---

Date of submission of the demand 25 July 2001 (25.07.2001)	Date of completion of this report 04 October 2002 (04.10.2002)
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230	Authorized officer LUONG NGUYEN Telephone No. (703)308-9297

Form PCT/IPEA/409 (cover sheet)(July 1998)

I. Basis of the report

1. With regard to the elements of the international application:*

    ☒ the international application as originally filed.

    ☒ the description:
    pages <u>1-50</u> as originally filed
    pages <u>NONE</u>, filed with the demand
    pages <u>NONE</u>, filed with the letter of _____.

    ☒ the claims:
    pages <u>51-58</u>, as originally filed
    pages <u>NONE</u>, as amended (together with any statement) under Article 19
    pages <u>NONE</u>, filed with the demand
    pages <u>NONE</u>, filed with the letter of _____.

    ☒ the drawings:
    pages <u>1-17</u>, as originally filed
    pages <u>NONE</u>, filed with the demand
    pages <u>NONE</u>, filed with the letter of _____.

    ☐ the sequence listing part of the description:
    pages <u>NONE</u>, as originally filed
    pages <u>NONE</u>, filed with the demand
    pages <u>NONE</u>, filed with the letter of _____.

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
    These elements were available or furnished to this Authority in the following language _____ which is:

    ☐ the language of a translation furnished for the purposes of international search (under Rule23.1(b)).

    ☐ the language of publication of the international application (under Rule 48.3(b)).

    ☐ the language of the translation furnished for the purposes of international preliminary examination(under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

    ☐ contained in the international application in printed form.

    ☐ filed together with the international application in computer readable form.

    ☐ furnished subsequently to this Authority in written form.

    ☐ furnished subsequently to this Authority in computer readable form.

    ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

    ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☒ The amendments have resulted in the cancellation of:

    ☒ the description, pages <u>NONE</u>

    ☒ the claims, Nos. <u>NONE</u>

    ☒ the drawings, sheets/fig <u>NONE</u>

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*
** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

INTERNATIONAL PRELIMINARY EXAMINATION REPORT	International application No.
	PCT/US01/01595

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. STATEMENT

Novelty (N)	Claims	8-10, 15, 17-24, 32-34, 39, 41-60	YES
	Claims	1-7, 11-14, 16, 25-31, 35-38, 40	NO
Inventive Step (IS)	Claims	NONE	YES
	Claims	1-60	NO
Industrial Applicability (IA)	Claims	1-60	YES
	Claims	NONE	NO

2. CITATIONS AND EXPLANATIONS
Please See Continuation Sheet

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

V. 2. Citations and Explanations:

Claims 1-7, 11-14, 16, 25-31, 35-38, 40 lack novelty under PCT Article 33(2) as being anticipated by Rabbani et al. (US 5,412,427).

Regarding claims 1 and 26, Rabbani et al. disclose an electronic camera utilizing image compression feedback for improved color processing, comprising receiving an image in a first color space RGB (R, G, B, figures 6-7, column 5, lines 5-35); storing information describing a second color space (Y', (R-Y'), (B-Y') are stored in storage module 28); transforming the image into said second color space (color transformation 14, figures 6-7, column 5, lines 42-56); interpolating the primary channel (interpolation 24, figure 7, column 5, lines 45-56); computing the secondary channels (summers 26a and 26b, figure 7, column 5, lines 45-56).

Regarding claims 2 and 27, Rabbani et al. disclose wherein Green incorporates colors that are substantially green (column 4, lines 10-36).

Regarding claims 3 and 28, Rabbani et al. disclose wherein said second color space comprises a GUV color space (color space Y, (R-Y'), (B-Y'), figure 6).

Regarding claim 4, Rabbani et al. disclose the secondary channels of the first olor space comprise predominantky Red and Blue (figure 6).

Regarding claims 5 and 29, Rabbani et al. disclose an RGB mosaic (figure 4).

Regarding claims 6 and 30, Rabbani et al. disclose a Bayer pattern (figure 4, column 5, line 4).

Regarding claims 7 and 31, Rabbani et al. disclose after the image is transformed into second color space, compressing the transformed image (compression stages 16a, 16b, figure 7, column 5, lines 40-50).

Regarding claims 11 and 35, Rabbani et al. disclose compresing step comprises individually compressing each plane (compression 16a, 16b, 16c, figures 6-7).

Regarding claims 12 and 36, Rabbani et al. disclose transmitting the compressed, transformed image to a target platform (compressed signals could be downloaded to a personal computer, column 6, lines 15-20).

Regarding claims 13 and 37, Rabbani et al. disclose computing device (personal computer, column 6, lines 15-20).

Regarding claims 14 and 38, Rabbani et al. disclose desktop computer (personal computer, column 6, lines 15-20).

Regarding claims 16 and 40, Rabbani et al. disclose wire-line transmission (cable interface, column 6, lines 15-20).

Regarding claim 25, Rabbani et al. disclose said transmitting step occurs before the primary channel of the second color cpace is interpreted to full resolution for the image

Form PCT/IPEA/409 (Continuation Sheet) (July 1998)

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

(figure 6).

Claims 17-21 lack an inventive step under PCT Article 33(3) as being obvious over Rabbani et al. (US 5,412,427).

    Regarding claim 17, Rabbani et al. fail to disclose restoring said compressed, transformed image at the target platform. However, Rabbani et al. disclose compressed image could be downloaded to the personal computer. Therefore, it would have been obvious to include the step of restoring the compressed image at the computer in order to display the image on the monitor for viewing.
    Regarding claims 18-19, Rabbani et al. disclose transforming the non-compressed image into a standard-format color image (JPEG format, column 4, line 60-65).
    Regarding claim 20, Rabbani et al. disclose transforming the non-compressed image into YUV color space (figure 6).
    Regarding claim 21, Rabbani et al. disclose transforming the non-compressed image into RGB color space (figure 6).

Claims 8-10, 23-24, 32-34 lack an inventive step under PCT Article 33(3) as being obvious over Rabbani et al. (US 5,412,427) in view of Wang et al. (US 5,682,152).

    Regarding claims 8 and 32, Rabbani et al. fail to disclose using transform-based compresion. However, Wang et al. teach compression algorithm using DCT (discrete cosine transform) algorithm (column 1, lines 55-60). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to the device in Rabbani et al. by the teaching of Wang et al. in order to transform image in JPEG format.
    Regarding claims 9 and 33, Wang et al. disclose wavelet transform-based compression (column 1, lines 55-60).
    Regarding claims 10 and 34, Wang et al. disclose DCT based compression (column 1, lines 55-60).
    Regarding claim 23, Wang et al. disclose quantization and entropy coding (see abstract).
    Regarding claim 24, Wang et al. disclose Huffman coding (see abstract).

Claims 15 and 39 lack an inventive step under PCT Article 33(3) as being obvious over Rabbani et al. (US 5,412,427) in view of Fukuoka (US 5,754,227).

    Regarding claims 15 and 39, Rabbani et al. fail to disclose said transmitting step is performed using wireless transmission. However, Fukuoka teaches images captured by the camera can be transferred through the I/O card 15 which functions as modem connected to an on-line service such as American On Line (column 3, lines 50-60). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Rabbani et al. by the teaching of Fukuoka in order to transmit the image to a remote device without using cable.

Claim 22 lacks an inventive step under PCT Article 33(3) as being obvious over Rabbani et al. (US 5,412,427) in view of Tsai et al. (US 5,172,227).

    Regarding claim 22, Rabbani et al. fail to disclose applying averaging technique. However, Tsai et al. teach image compression with color interpolation which the missing green pixels are computed by using center-weight average (column 8, lines 7-40). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to the device in Rabbani et al. by the teaching of Tsai et al. in order to compute the missing green pixel.

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Claims 41, 43, 48-54, 58-60 lack an inventive step under PCT Article 33(3) as being obvious over Rabbani et al. (US 5,412,427) in view of Bauchspies (US 6,008,847).

    Regarding claim 41, Rabbani et al. disclose an electronic camera utilizing image compression feedback for improved color processing, comprising an imager, disclosed as image sensor 40 (figure 7, column 5, lines 1-36); transforming module, disclosed as transformation stage 14 (figure 7, column 5, lines 37-56); compression module (compression stages 16a, 16b, 16c, figure 7, column 5, lines 40-55); a communication link (cable interface, column 6, lines 15-20); target device (personal computer, column 6, lines 15-20). Rabbani et al. fail to disclose a decompression module at the target device. However, Bauchspies teach a temporal compression and decompression system in which the compressed video stream 105 is transmitted over telephone line to a remote computer 92 (target device) for subsequent temporal decompression 106 (figure 2, column 5, lines 40-44). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to the device in Rabbani et al. by the teaching of Bauchspies in order to display the image on the monitor of the computer.

    Regarding claim 43, Bauchspies disclose lumimosity information at the image capture at the imager (luminance color space, column 5, lines 50-51).

    Regarding claim 48, Rabbani et al. disclose transformed image information in a wire-base manner (cable interface, column 6, lines 15-20).

    Regarding claim 49, it is well-known in the art to use a serial communication port in a communication link as a way to transmit data.

    Regarding claim 50, Rabbani et al. disclose interpolation module (interpolation 24', figure 3).

    Regarding claim 51, Rabbani et al. disclose said interpolation module applies YUV transformation for converting image in YUV color space (figure 3).

    Regarding claim 52, Bauchspies discloses a standard-compressed format at the target device (the system using discrete cosine transform (DCT), column 31, lines 34-40).

    Regarding claim 53, it is well-known in the art to use JPEG file format in discrete cosine transform (DCT).

    Regarding claim 54, it is well-known in the art to use JPEG compression in compressing image.

    As for claims 58-60, Rabbani et al. disclose the compressed signals could be downloaded to the personal computer. It would have been obvious that the lower-quality image is converted into higher-quality image in order to let the user could see a quality image.

Claims 42, 55-57 lack an inventive step under PCT Article 33(3) as being obvious over Rabbani et al. (US 5,412,427) in view of Bauchspies (US 6,008,847) further in view of Fukuoka (US 5,754,227).

    Regarding claim 42, Rabbani et al. and Bauchspies fail to disclose wireless communication link. However, Fukuoka teaches image data from camera 30 can be transmitted to computer 33 via cellular phone (wireless communication, figure 3, column 5, lines 40-45).

    Regarding claim 55, Fukuoka disclose a digital camera (digital camera 30, figure 3, column 4, lines 34-50); computer (computer 33, figure 3, column 4, lines 34-50); cellular phone (cellular phone, figure 3, column 5, lines 40-45).

    Regarding claim 56, Fukuoka disclose said communication link coupled to cellular phone (column 5, lines 40-48).

    Regarding claim 57, Fukuoka disclose computer connect to Internet (American On Line, column 3, lines 55-60).

Claims 44-47 lack an inventive step under PCT Article 33(3) as being obvious over Rabbani et al. (US 5,412,427) in view of Bauchspies (US 6,008,847) further in view of Wang et al. (US

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

5,682,152).
     Regarding claim 44, Rabbani et al. and Bauchspies fail to disclose using transform-based module. However, Wang et al. teach compression algorithm using DCT (discrete cosine transform) algorithm (column 1, lines 55-60). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to the device in Rabbani et al. and Bauchspies by the teaching of Wang et al. in order to transform image in JPEG format.
     Regarding claim 45, Wang et al. disclose wavelet transform-based compression (column 1, lines 55-60).
     Regarding claim 46, Wang et al. disclose DCT based compression (column 1, lines 55-60).
     Regarding claim 47, Bauchspies disclose a transformed-based decompression (decompression 106, figure 2, column 5, lines 40-44).

------------------NEW CITATION--------------
US 5,172,227 A (TSAI et al) 15 December 1992
US 5,412,427 A (RABBANI et al) 02 May 1995
US 5,682,152 A (WANG et al) 28 October 1997
US 5,754,227 A (FUKUOKA) 19 May 1998
US 6,008,847 A (BAUCHSPIES) 28 December 1999